Appendix 1, changes to the specification indicated with brackets and underlining:

Page 1, of the specification:

Decoupling Device for Actuators

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a 35 USC 371 application of PCT/DE 00/03045 filed on September 05, 2000.

BACKGROUND OF THE INVENTION

[Prior Art] Field of the Invention

The invention is [based on] directed on a decoupling device for [actuators according to the preamble to claim 1].

Description of the Prior Art

During operation of the actuator – in particular an electric motor which, by means of decoupling elements, is connected to a function housing via a decoupling housing – tangential rotary oscillations are produced, for example in a main excitation oscillation direction of the actuator, and oscillations are produced in the radial and axial directions. For a decoupling between the actuator and the decoupling housing, this means that they must be particularly soft in the tangential direction and must be significantly more rigid in the axial direction and radial direction.

Decoupling devices for actuators and electric motors are known, but these are relatively rigid. Running noise of the electric motor and running-induced oscillations of a fan connected for example to the electric motor, e.g. due to an imbalance of the impeller, are largely transmitted to a fan housing and lead to an undesirable generation of noise.

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However, the device requires a central securing element and for damping, requires another elastic element which is disposed around a longitudinal axis.

[Advantages of the Invention] SUMMARY OF THE INVENTION

The decoupling device according to the invention[, with the characterizing features of claim 1,] has the advantage over the prior art that an almost ideal decoupling of all oscillations of the actuator is achieved in a simple manner.

[Advantageous modifications and improvements of the decoupling device disclosed in claim 1 are possible by means of the steps taken in the dependent claims.]

The configuration of decoupling elements is advantageously embodied in the form of an "angular ball bearing", since as a result, powerful forces can be absorbed and oscillations in the tangential direction can be damped. Oscillations in the radial and axial directions are damped through elastic compression of the balls. The

decoupling elements are simply subjected to pressure in all of the loading directions of the system. This results in a favorable ability to withstand vibration.

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Particularly advantageous decoupling elements are rolling bodies in the form of balls made of an elastomer, which are connected to one another by means of an intermediary piece that is inserted into a slot of a securing element. This allows the decoupling elements to be very easily held and installed.

It is also advantageous to embody recesses that constitute the support shoulders for the decoupling elements in the shape of arcs.

It is also advantageous to distribute the decoupling elements uniformly in the circumference direction.

[Drawings] BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention are described herein below and are shown in a simplified fashion in the drawings, in which: [and will be explained in detail in the subsequent description.]

Fig. 1 shows a section through an actuator with a decoupling device,

Fig. 2 is a schematic depiction of existing stress directions,

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Fig. 3 shows an exemplary embodiment of decoupling elements,

Figs. 4 a – c show a first part of a decoupling housing,

Figs. 5 a & b show a securing element,

Figs. 6 a – c show a second part of a decoupling housing,

Fig. 7 shows a section along the line VII – VII in Fig. 1,

Figs. 8 a – c show another exemplary embodiment of a decoupling device and a decoupling element,

Fig. 9 shows another exemplary embodiment of a decoupling housing,

Fig. 10 shows another exemplary embodiment for a securing element and a decoupling housing,

Fig. 11 shows another possible disposition of the securing element and decoupling housing, and

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Fig. 12 shows another possible embodiment of support shoulders in a decoupling housing and a securing element.

[Description of the Exemplary Embodiments] DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a section through a decoupling device 1 with an actuator 2. This combination of the decoupling device 1 and actuator 2, for example an electric motor 2, has a longitudinal axis 3. The decoupling device 1 is comprised of a decoupling housing 6, which is composed, for example, of two [for example] annular parts, an upper part 7, and a base part 8. The decoupling housing 6 is adjoined by a function housing 13, for example a fan housing 13, which encompasses a fan 12 driven by the electric motor. The base part 8 of the decoupling housing 6 can, for example, also be part of the function housing 13. The decoupling housing 6 is then comprised of the housing parts 7 and 13.

The decoupling device 1 is also composed of elastic decoupling elements 14, 15 and a securing element 19, e.g. in the form of a ring in this instance. The decoupling elements 14, 15 here are for example rolling bodies which in this instance are embodied in the shape of balls and are made, for example, of an elastomer.

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The decoupling elements 14, 15 in this instance are disposed one above the other in pairs, for example, along a line 18 which extends parallel to the longitudinal axis 3. The actuator 2 is connected at least indirectly to the securing element 19.

The decoupling elements 14, 15 are connected to each other, for example, by means of an intermediary piece 20. A longitudinal axis of the intermediary piece [18] 20 extending parallel to the line 18 runs parallel to the longitudinal axis 3 when the decoupling device 1 is installed. The presence of the intermediary piece or strut 20 permits the two decoupling elements 14, 15 to be very easily held simultaneously and permits them to be installed as an ensemble with the securing element 19.

In both decoupling housing halves 7, 8, [13,] there are recesses 23 that open toward the longitudinal axis 3 and are disposed in the outer radial edge region, which constitute support shoulders 24, 25 in the top part 7 or bottom part 8[, 13] of the decoupling housing for the decoupling elements 14, 15. The securing element 19 disposed inside the decoupling housing 6, 7, 8[, 13] provides support shoulders 26 disposed opposite from the support shoulders 24, 25.

The support shoulders 24 – 26 have sections which are disposed in the radial direction and are referred to as radial

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support shoulders 24.2, 25.2, 26.2. These are engaged by axial forces. The support

shoulders 24 – 26 also have sections which are disposed in the axial direction and are referred to as axial support shoulders 24.1, 25.1, 26.1. These are acted on by radial forces. Axial support shoulders 24.1, 25.1, 26.1 and radial support shoulders 24.2, 25.2, 26.2 are disposed for example perpendicular to each other here.

The support shoulder 24.1 is referred to as the axial support shoulder because it extends approximately parallel to the longitudinal axis 3. The support shoulder 24.2 is referred to as the radial support shoulder because in this instance, it extends approximately perpendicular to the longitudinal axis 3.

Because the decoupling elements 14, 15 are secured in the recesses 23 (Fig. 7) and are connected to each other by means of the intermediary piece 20, it is not possible for the securing element 19 to rotate entirely around the longitudinal axis 3.

The support shoulders 24 – 26 are embodied so that when there is a relative rotation of the securing element 19 in relation to the decoupling housing 6, 7, 8[, 13,] the decoupling elements 14, 15 roll around a rotational axis 27 that extends obliquely in relation to the longitudinal axis 3. In

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The top part 7 can also be embodied as cup-shaped 33, as indicated with dashed lines in Fig. 4b. In this instance, the top part 7 contains for example three recesses 23, which constitute the support shoulders 24.1, 24.2 for the decoupling elements 14. In Fig. 4a, center lines are shown extending from the recesses 23,

perpendicular to the longitudinal axis 3 that extends perpendicular to the plane of the drawing. The drawing clearly shows that recesses 23 adjacent to one another in the circumference direction and decoupling elements 14 disposed in the recesses 23 are disposed at a uniform angle α from one another. In Fig. 7, a section VII – VII in Fig. 1 is shown, which shows the recess 23 more clearly.

After assembly, the decoupling elements 14, 15 rest against the support shoulders 24.1, 24.2, 25.1, 25.2.

Fig. 4b shows a plane 34 which extends perpendicular to the longitudinal axis 3 and passes through the radial support shoulder 24.2. The recesses 23 and therefore the decoupling elements 14 are thus disposed, for example, in one plane.

In an outer region of the top part 7, there is a bore 37 through which for example a screw is guided, in order to connect the top part 7 to the base part 8[,] and housing 13.

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Fig. 10 shows another exemplary embodiment for the securing element 19 and a decoupling housing part 7, 8, 13. For example, the decoupling elements 14, 15 and 14', 15' are not disposed above one another. The decoupling elements 14, 14' or 15, 15' are not disposed in a plane extending perpendicular to the longitudinal axis 3. Decoupling elements 14', 15' that are connected to each other by means of the intermediary piece 20 (right half of Fig. 10) and other decoupling elements 14,

15 which are not connected to each other by means of an intermediary piece (left half of Fig. 10) can both be used in an embodiment of the decoupling device 1. The decoupling elements 14, 15 have a knob 48, which protrudes into a recess 45, a hole 45, or a slot 36. The decoupling elements 14', 15' are connected to each other by means of the intermediary piece 20, which does not extend parallel to longitudinal axis 3 after assembly of the decoupling device 1.

Fig. 11 shows another possible configuration of the securing element 19 and decoupling housing 6. Since the same reference numerals apply as in Figs. 1 and 5, no further explanation is given for them here.

In this instance, the decoupling elements 14, 15 are disposed over one another [in this instance], in pairs for example, along a line 18 which extends parallel to longitudinal axis 3. The recess 23 here is embodied in the

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already described above. Any other combination is conceivable depending on the magnitude of the load.

The foregoing relates to a preferred exemplary embodiment of the invention, it being understood that other variants and embodiments are thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.

ABSTRACT OF THE DISCLOSURE

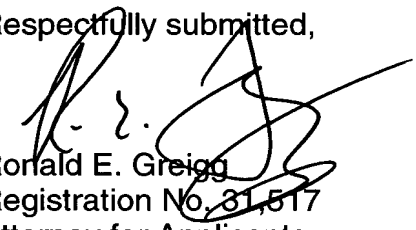
Please substitute the attached Abstract of the Disclosure for the abstract as originally as filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully submitted.

Respectfully submitted,



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